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Research note

First record of *Ophiura ljungmani* (Echinodermata: Ophiuroidea) from an anchialine cave in the Mexican Caribbean

Primer registro de Ophiura ljungmani *(Echinodermata: Ophiuroidea) de una cueva anquihalina en el Caribe mexicano*

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Abstract

One specimen of *Ophiura ljungmani* Lyman, 1878 was collected in an anchialine cave in Cozumel Island, Quintana Roo. The finding represents the first record of this ophiuroid in an anchialine cave, and also the shallower record for the species in any habitat.

Keywords: New record; Ophiuroid; Anchialine cave; Quintana Roo; Aerolito; Caribbean Sea

Resumen

Un espécimen de *Ophiura ljungmani* Lyman, 1878 fue recolectado en una cueva anquihalina en la isla de Cozumel, Quintana Roo. Este es el primer registro de dicho ofiuroideo en una cueva anquihalina y también la menor profundidad documentada de dicha especie en cualquier ambiente.

Palabras clave: Nuevo registro; Ofiuroideo; Cueva anquihalina; Quintana Roo; Aerolito; Mar Caribe

The genus *Ophiura* Lamarck, 1801 (family Ophiuridae Müller & Troschel, 1840) is distinguished by having a disc low, flat, covered by small imbricating plates, primary rosette usually distinct. Radial shields more or less separated. Arms not stout, gradually tapering, usually deep incisions next to arm bases, bursal slits distal. Dorsal arm plates well developed, adjacent plates usually contiguous, several proximal dorsal plates included in disc, separating radial shields. Genital papillae well developed, arm combs present. Second oral tentacle pore opens into mouth slit, beset with numerous small papillae, which often form a continuous row with oral papillae. Ventral arm plates much wider than long, usually separated, at least outside disc (Stöhr, Jagt, & Klompmaker, 2011). Currently, 286 child taxa are recognized in the genus *Ophiura* according to the latest census of the Ophiuroidea (Stöhr, 2014).

On July 30, 2011, 1 specimen of *O. ljungmani* was collected in the Yucatán Peninsula in a shallow water habitat (12 m depth) (Fig. 1), living on muddy bottoms in an anchialine cave. This record from cenote Aerolito de Paraíso, Cozumel

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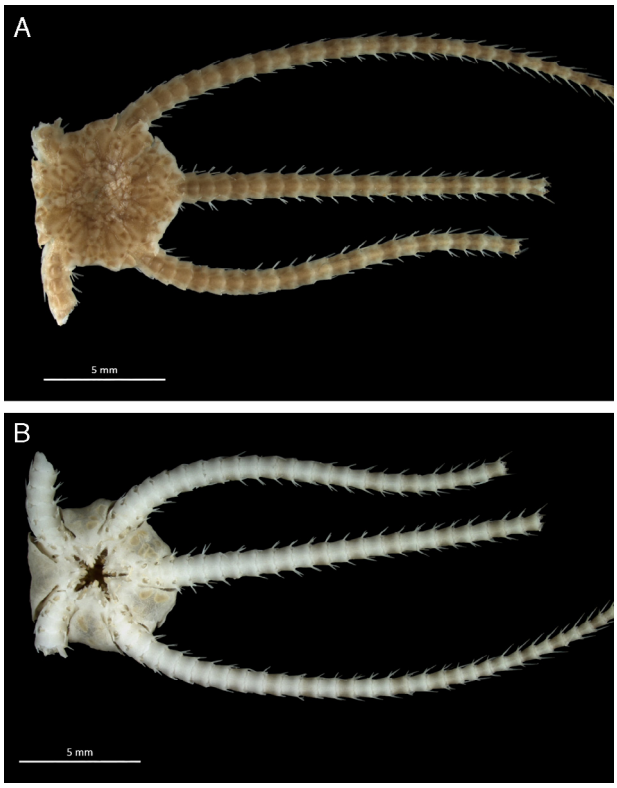

Figure 1. *Ophiura ljungmani* Lyman, 1878. ICML-UNAM 10929. A, aboral side; B, oral side.

Island, Quintana Roo, Mexico, constitutes the first time that *O. ljungmani* has ever been collected in an anchialine cave habitat. Cenote Aerolito is located close in the western coast of Cozumel (20°27′58.4″ N, 86°58′41.2″ W) and has a longitude of 6,100 m. The maximum depth of the cave is 27 m and the average is 12 m. It has a connection with the sea at 240 m from the main entrance. The cave passageways were formed mainly by rock dissolution. The dominant type of sediment at 14–18 m depth is clay and mud. The average water temperature is 25 °C, with a halocline at 7 m of depth (Mejía-Ortíz, 2008).

The collected specimen was identified using the diagnosis by Lyman (1878) and deposited in the Colección Nacional de Equinodermos de México, Instituto de Ciencias del Mar y Limnología, Universidad Nacional Autónoma de México (ICML-UNAM).

Systematics order OPHIURIDA Müller & Troschel, 1840
Family OPHIURIDAE Müller & Troschel, 1840
Genus Ophiura *Lamarck, 1801*
Ophiura ljungmani Lyman, 1878

Ophioglypha ljungmani: Lyman, 1878: 71, Plate 3, figure 7 (diagnosis). *Ophiura ljungmani*: Clark, 1954: 376; Farran, 1913: 31 (mention); *Ophiura* (*Ophiura*) *ljungmani*: Paterson, 1985: 118–20, figure 44 (diagnosis); Laguarda-Figueras, Hernández-Herrejón, Solís-Marín, and Durán-González, 2009: 74; Hernández-Herrejón, Solís-Marín, and Laguarda-Figueras, 2008: 101.

Geographical distribution. Ophiura ljungmani Lyman, 1878 occur throughout the Atlantic Ocean, the Gulf of Mexico and

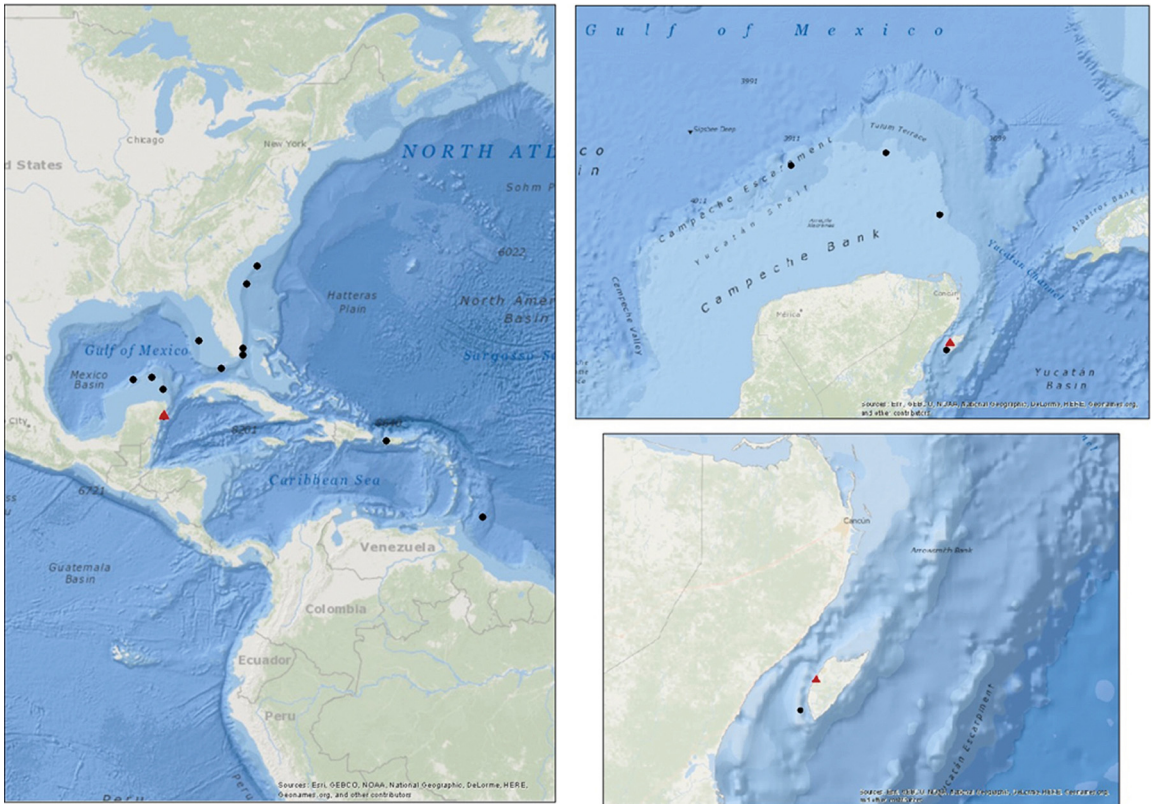

Figure 2. Distribution map of *O. ljungmani* in the Caribbean, red spot, new record on Cozumel Island.

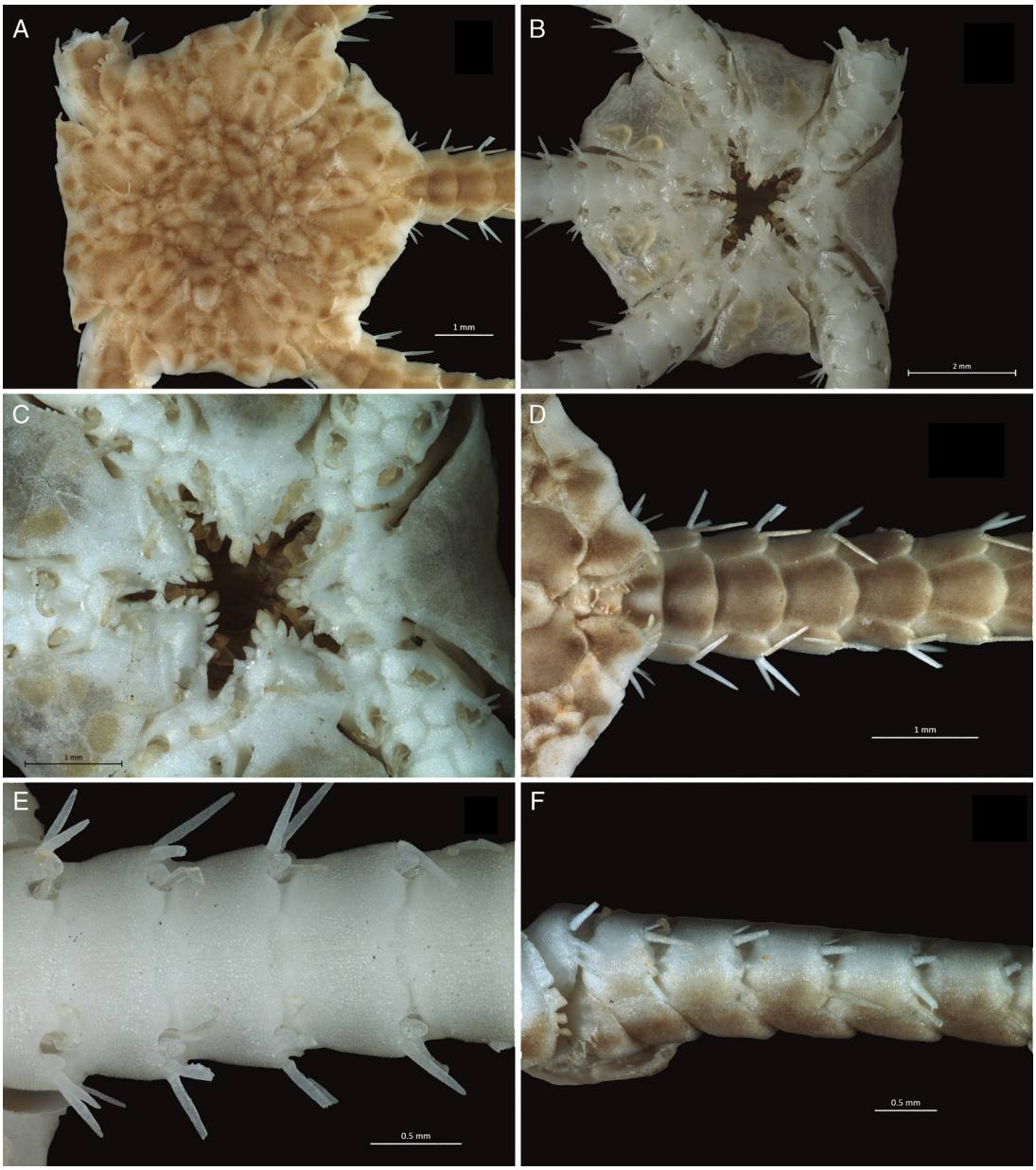

Figure 3. *Ophiura ljungmani*. (ICML-UNAM 10929). A, disc, dorsal view; B, disc, ventral view; C, detail of the oral side showing the mouth and jaws; D, portion of arm showing the fan shaped arm spines at the base of the arm and the dorsal arm plates; E, detail of arm showing ventral arm plates; F, lateral arm plates.

the southwest of Pacific Ocean: off New Jersey, USA (2,504 m depth) (USNM E50908); Hudson Canyon, USA (2,211 m depth) (USNM 14168); Miami, Florida, USA (353 m depth) (USNM 14659) (287 m depth) (USNM 14666); Key Largo, south of Florida Keys, USA (102 m depth) (USNM 14668); off entrance of San Juan Harbor, Puerto Rico (82 m depth) (USNM 21343); off entrance of Mayaguez Harbor, Puerto Rico (46–55 m depth) (USNM 21344); off Point Melomas Mayaguez Harbor, Puerto Rico (61 m depth) (USNM 21345); off Fowey Rocks Light, Cape Florida, USA (366 m depth) (USNM 33699), (311 m depth) (USNM 34038); Campeche Bank, Mexico (Vázquez-Bader et al., 2008); Campeche Bank, Mexico (76.2 m depth) (ICML-UNAM 3.133.0); Feni Ridge, southern Rockall Trough (Pearson & Gage, 1984); Lucky Strike, Mid-Atlantic Ridge (1,700 m depth) (Stöhr & Segonzac, 2005); Ubatuba, Brazil (Sumida & Pires-Vanin, 1997); Lydonia Canyon, USA (1,404 m depth) (USNM 1010910); Bear Seamount, USA (1,409 m depth) (USNM 1016092); off Iceland (1,921 m depth) (GBIF-Sweden-90627), off western Iceland (2,005 m depth) (GBIF-Sweden-120206061); off Sao Paulo, Brazil (Amaral & Rossi-Wongtschowski, 2004); Point triple des Azores, Portugal (844 m depth) (Martynov & Litvinova, 2008); Tasman Sea, Australia (Australian Museum J.23607, OZCAM); Gulf of Guinea, Nigeria (MNHN 1047), off St. Vincent, Saint Vincent and the Grenadines (YUPM IZ 007684.EC); South Africa (NHMUK 1986.7.15.54-72); Bay of Biscay (4,144 m depth) (IFREMER 18514); Norwegian Sea (2,714 m depth) (IFREMER 32652); south of Yucatán Channel, Cozumel Island, Mexico (406 m depth) (USNM 33696); northeast of Tobago, Trinidad and Tobago (1,609 m depth) (USNM 33701); north-

west of Cabo Catoche, Mexico (47.4 m depth) (ICML-UNAM 3.133.1).

The information on distribution come from the databases of the following collections: Australian Museum Collection; GBIF-Sweden: Invertebrates; IFREMER – Institut Français de Recherche pour l'Exploitation de la Mer, France; MNHN – Muséum National d'Histoire Naturelle, France; USNM: NMNH – National Museum of Natural History, Smithsonian Institution, USA; YUPM – Yale University Peabody Museum, USA; and NHMUK – Natural History Museum, United Kingdom.

Material examined. ICML-UNAM 10929, 1 specimen (disc diameter 6.30 mm, longest arm 35.52 mm), Cenote Aerolito del Paraíso, Cozumel, Quintana Roo, Mexico (20°27.950′ N, 86°58.6945′ W) (Fig. 2); on muddy bottom, 12 m; colls. Guadalupe Bribiesca and Elisa García; July 30, 2011; SCUBA.

Diagnosis (modified from Lyman, 1878). The disc is pentagonal and thin; covered by small scales amongst which it is possible to distinguish the centrodorsal scale but not usually the primary radial scales. There are simple spinelets scattered over the dorsal surface of the disc although they are often rubbed off in preserved specimens. The radial shields are longer than broad; each pair separated by a wedge of plates. The arm combs are distinct, extending on to the dorsal side of the arm; the outer comb spinelets are thin and pointed, the inner ones small and pointed.

There are 1 or 2 pointed apical papillae at the apex of the jaw flanked on each side by 6–7 pointed oral papillae. The second oral tentacle pore is large, opening superficially away from the mouth, and it is armed with 2 rounded tentacle scales. The adoral shields are long, narrow and slightly flared distally. The genital slits are edged with rounded papillae proximally which become more elongated and spine-like until they merge at the edge with the arm comb-spinelets.

The arms are about 3–5 times the disc diameter, and slightly compressed laterally. The dorsal arm plates are longer than broad, rectangular in the proximal portion and becoming fan shaped in the distal part. The ventral arm plates are approximately pentagonal in shape, becoming broader than long and rectangular on distal segments. Three arm spines, the longest one located dorsally and nearly equal in length to segment, the other 2 much shorter and located on the ventral portion of the arm adjacent to the tentacle pores (Fig. 3).

Bathymetric distribution. *Ophiura ljungmani* bathymetric distribution goes from 46 to 6,398 m (Alvarado-Barrientos & Solís-Marín, 2013; Cherbonnier & Sibuet, 1972). In this work, the bathymetric interval of *O. ljungmani* is extended to its shallower limit (12 m). This finding represents the first record of this ophiuroid in an anchialine cave in a shallow environment.

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